

Amendment to Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended) A thermal management apparatus, comprising:
a carrier substrate having a first side and an opposite second side and an opening extending from the first side to the second side; and
a protective cover disposed to substantially enclose the first side; and
a thermal conductor dimensioned to fit in the opening to facilitate transfer of heat generated by ~~an~~ a first electronic component attached to the first side for dissipation exclusively at the second side.
2. (Currently amended) The thermal management apparatus of Claim 1, further comprising a first heat dissipation device coupled to the first electronic component and the thermal conductor, and configured to transfer heat generated by the first electronic component to the thermal conductor.
3. (Original) The thermal management apparatus of Claim 2, wherein the first heat dissipation device is one of a low profile heat sink and heat spreader.
4. (Original) The thermal management apparatus of Claim 2, wherein the carrier substrate is at least part compliant with a standard and the aggregate thickness of the component and the first heat dissipation device is within a dimension requirement of the standard.
5. (Original) The thermal management apparatus of Claim 4, wherein the standard is PICMG 3.0 ATCA, and the dimension requirement is 4.66mm.

6. (Currently amended) The thermal management apparatus of Claim 4 5, wherein the first side is covered with a nonconductive material and the aggregate thickness of the nonconductive material, the component, and the first heat dissipation device is less than or equal to 4.66 mm.

7. (Currently amended) The thermal management apparatus of Claim 1, wherein the ~~one or more thermal conductors are a selected one of~~ conductor is one selected from the group consisting of a solid core conductor, a liquid filled conductor and a heat pipe.

8. (Currently amended) The thermal management apparatus of claim 1, ~~wherein the device further comprising comprises~~ a second heat dissipation device disposed on the second side and thermally coupled to the ~~one or more~~ thermal conductors to dissipate said heat transferred away from the component disposed on the first side.

9. (Original) The thermal management apparatus of Claim 8 wherein the second heat dissipation device is configured to transfer heat to a surrounding environment.

10. (Currently amended) The thermal management apparatus of Claim 9, wherein the second heat dissipation device is one selected from the group consisting of an air cooled, liquid cooled, thermoelectric, and phase change ~~device~~.

11. (Currently amended) The thermal management apparatus of Claim 8, wherein the second heat dissipation device is removably coupled to the thermal conductors by a fasteners and retains the first heat dissipation device against the first side electronic component.

12. (Currently amended) The thermal management apparatus of Claim 8 wherein the second heat dissipation device is configured to thermally couple to a second electronic component disposed on the second side.

13. (Currently amended) A modular platform, comprising:
a shelf;
a plurality of modular platform boards, at least one of the boards including a thermal management apparatus, the thermal management apparatus comprising
a carrier substrate having a first side and an opposite second side and an opening extending from the first side to the second side; and
a protective cover disposed to substantially enclose the first side; and
a thermal conductor dimensioned to fit in the opening to facilitate transfer of heat generated by ~~an~~ a first electronic component attached to the first side for dissipation exclusively at the second side.

14. (Currently amended) The modular platform of Claim 13, further comprising a first heat dissipation device coupled to the first electronic component and the thermal conductor, and configured to transfer heat generated by the first electronic component to the thermal conductor.

15. (Original) The modular platform of Claim 14, wherein the first heat dissipation device is one of a low profile heat sink and heat spreader.

16. (Original) The modular platform of Claim 14, wherein the carrier substrate is at least part compliant with a standard and the aggregate thickness of the component and the first heat dissipation device is within a dimension requirement of the standard.

17. (Original) The modular platform of Claim 16, wherein the standard is PICMG 3.0 ATCA, and the dimension requirement is 4.66mm.

18. (Currently amended) The modular platform of Claim 16 ~~47~~, wherein first side is covered with a nonconductive material and the aggregate thickness of the nonconductive material, the component, and the first heat dissipation device is less than or equal to 4.66 mm.

19. (Currently amended) The modular platform of Claim 13, wherein the ~~one or more thermal conductors are a~~ conductor is one selected from the group consisting of one of a solid core conductor, a liquid filled conductor and a heat pipe.

20. (Currently amended) The modular platform of claim 13 ~~wherein the device further comprising~~ comprises a second heat dissipation device disposed on the second side and thermally coupled to the ~~one or more thermal conductors~~ to dissipate said heat transferred away from the component disposed on the first side.

21. (Original) The modular platform of Claim 20 wherein the second heat dissipation device is configured to transfer heat to a surrounding environment.

22. (Currently amended) The modular platform of Claim 21, wherein the second heat dissipation device is one selected from the group consisting of an air cooled, liquid cooled, thermoelectric, and phase change ~~devices~~.

23. (Currently amended) The modular platform of Claim 20, wherein the second heat dissipation device is removably coupled to the thermal conductors.

24. (Currently amended) The modular platform of Claim 20 wherein the second heat dissipation device is configured to thermally couple to a second electronic component disposed on the second side.

25. (Currently amended) A thermal management method, comprising:
providing a carrier substrate having a first side and an opposite second side and an opening extending from the first side to the second side, and ~~an~~ a first electronic component coupled to the first side;

providing a thermal conductor dimensioned to fit in the opening to facilitate transfer of heat generated by an a first electronic component attached to the first side for dissipation at the second side; and

substantially enclosing the first side with a protective cover; and

transferring heat from the electronic component exclusively to the second side via the thermal conductor.

26. (Currently amended) The method of Claim 25, further comprising:

providing a first heat dissipation device coupled to the first electronic component; and

coupling the first heat dissipation device to the thermal conductor.

27. (Original) The method of Claim 25, further comprising:

providing a second heat dissipation device;

coupling the second heat dissipation device to the thermal conductor on the second side;

transferring heat from the thermal conductor to the second heat dissipation device; and

transferring heat from the second heat dissipation device to a surrounding environment.

28. (New) The thermal management apparatus of Claim 1, further comprising one or more additional openings extending from the first side to the second side, and one or more additional thermal conductors dimensioned to fit in the one or more additional openings to facilitate transfer of heat generated by the first electronic component.

29. (New) A modular platform of Claim 13, further comprising one or more additional openings extending from the first side to the second side, and one or more additional thermal conductors dimensioned to fit in the one or more additional openings to facilitate transfer of heat generated by the first electronic component.